

Wicked Problems in Large Organizations: Why Pilot Retention Continues to Challenge the Air Force

A Monograph

by

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Abstract

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This monograph in military studies investigates the makeup of and approach to complex problems, with a case study on the Air Force's enduring struggle to retain fighter pilots. The research question asks what key considerations should large organizations, like the US Air Force, focus on when approaching complex problems. The hypothesis of this paper is that large organizations must strive to best understand the issue, its root cause, and available assets within the given time restraints. They should consider, and when possible, test, how solutions will affect the specific problem and the future of the organization itself through research, reflection, and long-term observation of implemented solutions.

The first section covers numerous aspects of organizational theory and wicked problems. Next is an explanation of the vision and mission of the Air Force, its current priorities, as well as a short, recent history of the pilot retention problem. Following that is a case study on the work done by the Air Staff in 2015-16 in regards to this complex problem, with analysis on the process as it compares to the hypothesis of this monograph. It shows that their recent approach, unlike those of the past, is in line with the hypothesis and appropriately working towards viable solutions. Finally, the conclusion summarizes lessons learned through this research about approaching wicked problems.

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Acronyms

CSAF	Chief of Staff of the Air Force
SECAF	Secretary of the Air Force
SMP	Strategic Master Plan
USAFE	United States Air Forces in Europe

Introduction

In virtually every organization, regardless of mission and function, people are frustrated by problems that seem unsolvable.

—Margaret J. Wheatley

The term “wicked problems,” introduced by Horst Rittel and Melvin Webber in their 1973 article “Dilemmas in a General Theory of Planning,” refers to complex problems that lack simple solutions.¹ In fact, there will usually be no complete solution at all for a complex problem, but at best a temporary resolution as the problem continues to evolve.² Large organizations, such as the US Air Force, face numerous wicked problems because they operate as complex adaptive systems, where actors and choices continuously cause second- and third- order effects, often unpredicted or unnoticed. Limited by mission requirements within time, space, and budget constraints, the Air Force has struggled with the successful management of pilot retention for decades, negatively impacting the mission and quality of life for airmen who choose to remain in the service. The intent of this monograph is twofold. First, it aims to understand what characteristics lead to success in large organizations when facing complex problems. Second, using the lens of a successful organization, it analyzes the case study of fighter pilot retention in 2015-2016 to understand how the Air Force approaches challenges such as this, and why this one has plagued it for so long. Ultimately, the question driving this research is: what key considerations should large organizations, like the US Air Force, focus on when approaching complex problems?

The hypothesis of this monograph is that large organizations must strive to best understand the issue, its root cause, and available assets within the given time restraints. They should consider, and when possible, test, how solutions will affect the specific problem and the future of the

¹ See Appendix 1.

² Horst W. J. Rittel and Melvin M. Webber, “Dilemmas in a General Theory of Planning,” *Policy Sciences* 4 (1973): 155-69, accessed September 26, 2016, http://www.uctc.net/mwebber/Rittel+Webber+Dilemmas+General_Theory_of_Planning.pdf.

organization itself through research, reflection, and long-term observation of implemented solutions. This small list of understanding, consideration, and observation entails a great deal of effort and dedication on the part of the problem solvers, not only because of the significant challenges it creates but because the list can never be checked off as complete. Even as planners work toward resolution, the environment constantly changes. These concepts are discussed in more detail in the first section, as pursuing them provides the best foundation for the problem solvers to build on as the situation unfolds.

In order to understand how organizations should solve problems, the first section introduces multiple aspects of organizational theory, complexity, learning organizations, and problem framing and solving in a literature review. Culture and power play a significant role in organizational performance, as described in Mary Jo Hatch and Ann Cunliffe's *Organization Theory*.³ Additionally, before a large organization can adequately tackle complex problems, it must have a solid foundation, which includes being a learning organization. Peter Senge's work explains the requirements and benefits of being a learning organization in his book *The Fifth Discipline* and provides archetypes for managing problems.⁴ Further research on theories of complexity, groupthink, and wicked problems support the hypothesis that understanding the root cause, available tools, and possible outcomes are necessary to efficiently and adequately approach complex problems.

Building on these concepts, the next section covers specifics on Air Force culture, including organization, strategy, and a brief history of the pilot retention problem, to explain the current climate of the organization. The Chief of Staff of the Air Force's (CSAF) priorities and expectations give a view from the top down, while additional research shows the mentality of those

³ Mary Jo Hatch and Ann L. Cunliffe, *Organization Theory: Modern, Symbolic, and Postmodern Perspectives*, 2nd ed. (New York: Oxford University Press, 2006), 175-219, 251-92.

⁴ Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*, rev. ed. (New York: Doubleday, 2006).

who work the line. Multiple studies by the nonprofit RAND Corporation and others explain changes in that environment due to internal and external factors, including talent management and competition with civilian airlines. These different viewpoints combine to paint a picture of the current climate of the Air Force, especially in regards to morale and career expectations.

The next section takes all of these ideas into account with a case study and analysis of the 2015-2016 fighter pilot retention crisis, and the approach the Air Staff took in its attempts to solve it. With only 85 percent manning, the fighter pilot community loses more pilots each year than it can replace, with the net losses constantly increasing and experience levels diminishing, severely limiting its mission capabilities.⁵ The issue of pilot retention is not new but has challenged the Air Force for generations. Over time, numerous short-term fixes yielded short-term results, but the problem continued to evolve and grow. What prevented this problem from being solved? Was it lack of concern, or resources, or was it just too hard?

Perhaps this wicked problem has no solution. Even if that is the case, the Air Force recognized the need to develop a better resolution before mission capabilities were compromised any further. In a shift from previous attempts of throwing money at the problem through bonuses and the like, the Air Force took a step back to analyze the problem in its entirety. The staff found that not only was fighter pilot retention a wicked problem in and of itself, but a symptom of a larger wicked problem that would require them to redesign the fighter community.

Staffing documents and information provided by the project lead on the Air Staff show both the solutions being worked and the process they used to arrive at those solutions. Analysis of the approach shows strengths and areas that require further observation, but it will be years before the solutions are fully implemented and measurable. Therefore, the analysis of this case study focuses on the approach and process of the Air Staff's problem solving and does not attempt to argue for the "best" solution.

⁵ Col. Jason Cockrum, telephonic interview by author, August 31, 2016.

Finally, this monograph will conclude with a review of the hypothesis and recommendations of if and how large organizations, specifically, the US Air Force, can improve the way they deal with complex problems. This paper does not aim to solve any specific problems. Rather the objective is to understand the key considerations to focus on when approaching complex problems so that large organizations are better prepared to deal with ones that are sure to arise.

Literature Review: Organizational Theory

At the heart of a learning organization is a shift of mind—from seeing ourselves as separate from the world to connected to the world, from seeing problems as caused by someone or something “out there” to seeing how our own actions create the problems we experience.

—Peter Senge, *The Fifth Discipline*

Large organizations are inherently complex. Even when efficiently led and operating, the various agents and artifacts that make up that organization continuously affect each other. Add a wicked problem to the mix, and the variables are infinite. Before attempting to analyze and understand wicked problems, however, it is necessary to understand the characteristics of organizations and what requirements enable them to function efficiently. Any attributes the organization lacks will impede its ability to build the shared understanding required. Therefore, this section begins with some foundational requirements from organizational theories, focusing on aspects that affect problem framing and solving.

Organizations

Organization is defined as “an organized body of people with a particular purpose, especially a business, society, association, etc.”⁶ Because people are the building blocks of an organization, culture plays a great role in determining how that organization operates. According to

⁶ “Organization,” Oxford Living Dictionaries, accessed March 8, 2017, <https://en.oxforddictionaries.com/definition/organization>.

Hatch and Cunliffe, the complex relationships between members and the environment they operate in continually influence each other.⁷ Social theorists Berger and Luckmann also emphasize the ideas of institutionalism and how the ongoing dialectic between members of a group continue to sway the social reality of that group.⁸ As people share their beliefs and ideas, they can slightly or at times drastically change their perception of reality and the organization they are a part of, which in turn affects the social reality of that organization. These concepts show that an organization is more of a living, breathing thing than a solid, stable structure, which therefore makes predictions more challenging. While a particular solution to a problem may or may not involve changing the culture, a study of a problem must always include the cultural aspect, for that culture cannot be separated from the organization itself, be it a private organization or government agency such as the Air Force.

Three of the main concepts Hatch and Cunliffe focus on are the use of power, control, and conflict.⁹ Among the relationships and culture previously mentioned, there is a constant pull for power within organizations. Both formal and informal, these struggles found in a chain of command, or between peers and coworkers, form much of the structure an organization rests on. This is not always a negative thing, nor is it always about placement or personal gain. Conflict often involves competition for resources, or choosing the best solution for a problem. To understand what assets are truly available for problem solving, understanding the sources of power, control, and conflict are necessary. Problem solvers may come up with the “perfect” solution, but if they lack the power to pull the resources required, whether that is money, manpower, or the like, they cannot

⁷ Hatch and Cunliffe, 175.

⁸ Peter L. Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Doubleday, 1966), 61-67.

⁹ Hatch and Cunliffe, 251.

see that solution through. In a government organization like the Air Force, internal and external competition for resources will always play a significant role in solving a problem.

Complexity

Beyond the basic structures and relationships, social systems have emerging properties that may not be observable, but are real. As theorist Neil Harrison explains in *Complexity in World Politics: Concepts and Methods of a New Paradigm*, the sum of the parts is more than the whole when it comes to organizations, which makes solving complex problems even more challenging.¹⁰

This idea of complexity extends to another theoretical concept, the complex adaptive system, which clarifies what those intricacies mean to development and problem solving. As described by Robert Axelrod and Michael D. Cohen in *Harnessing Complexity*, individual agents act within their environment based on their own strategies, in turn affecting other agents, populations, and the environment itself. These interactions result in change, create variation in strategies, and over time lead to interaction patterns within a population.¹¹ In an organization, this means that personalities, interactions, and decisions from big to small have an impact on that organization. When looking at solving a problem, this aligns with Rittel and Webber's idea that any attempt to solve a wicked problem generates "waves of consequences over an extended—virtually an unbounded—period of time."¹² Axelrod and Cohen go on to explain that as actors continue to adapt to each other in a system, strategies change at all levels. As larger populations become involved, a coevolutionary process occurs, whereby these populations continue to adapt.¹³

¹⁰ Neil E. Harrison, *Complexity in World Politics: Concepts and Methods of a New Paradigm* (Albany: SUNY Press, 2006), 25-42.

¹¹ Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York: Basic Books, 2000), 4-6.

¹² Rittel and Webber, 163.

¹³ Axelrod and Cohen, 8.

Because a large organization itself is complex, any attempts at problem solving within that organization will deal with the same complexities.

These explanations of how to think about a complex adaptive system can aid a planner in understanding, and perhaps predicting how, forces and choices will affect the organization by exploring expectations in depth. But it should also make them realize that infinite variables and “what ifs” mean that there will never be a complete understanding of a complex adaptive system such as a large organization. Former Secretary of State Colin Powell believed that the prime time to make a decision was when he had forty to seventy percent of the information available; by the time he had all of the information it was already irrelevant and the opportunity would be missed.¹⁴ His concern was more about making timely decisions, but the fact remains that “all” the information will have changed by the time it is obtained in a complex system or situation. Ultimately, there comes a time when enough information and analysis will have to do, and action must be taken. Referring back to the hypothesis of understanding the issue, deciding when and how to move on from initial analysis to implementation are critical decisions by those with the power and knowledge to do so.

Learning Organizations and Archetypes

This chapter so far has explained the basics of organizational structure and operation, but what does it take for an organization to succeed? Learning organizations encourage progress and success through adaptability and cooperation. According to McGill and Slocum, a learning organization should have the following characteristics: openness to experience, encouragement of responsible risk-taking, and a willingness to acknowledge failures and learn from them.¹⁵ This goes

¹⁴ Colin L. Powell and Tony Koltz, *It Worked for Me: In Life and Leadership*, first ed. (New York: Harper, 2012), 146.

¹⁵ Michael E. McGill and John W. Slocum, Jr., *The Smarter Organization: How to Build a Business that Learns and Adapts to Marketplace Needs* (New York: John Wiley & Sons, 1994), 13.

beyond changing just for the sake of changing or trying something new, and instead achieving a learning opportunity for future improvement, with or without the success that was initially sought after. In complex systems and when dealing with wicked problems, organizational learning goes hand in hand with adapting to the constantly evolving situation.

Peter Senge's *The Fifth Discipline* breaks down the different components and attributes of a learning organization, as well as recommendations on improving learning skills. While he necessarily divides his book into different topics and ideas to explain them in better detail, he emphasizes from the very beginning that by breaking down problems "we can no longer see the consequences of our actions; we lose our intrinsic sense of connection to a larger whole."¹⁶ In line with organizational and complex adaptive system theories, Senge's notion of learning organizations acknowledges that intangible yet critical notion of the synergistic "whole."

Senge also explains multiple learning disabilities that limit organizations, with the core dilemma being the delusion of learning from experience: "we learn best from experience but we never directly experience the consequences of many of our most important decisions."¹⁷ This disability contributes to the challenges of wicked problems, for as Rittel and Webber point out, implemented solutions will create waves of consequences for an indefinite amount of time.¹⁸ Considering this, it is easy to see how a wicked problem like pilot retention could continue to challenge the Air Force. By the time solutions are implemented, many of those that initiated the process will have been replaced by colleagues. Even with a good handoff from their predecessors, lack of continuity diminishes the analyzation of results, and therefore the success at solving a problem for good.

¹⁶ Senge, 3.

¹⁷ Ibid., 23.

¹⁸ Rittel and Webber, 163.

Another important takeaway from Senge's work in regards to this research is found in his explanation of system archetypes, which simplify the underlying complexity of problems.¹⁹ His argument is that not all problems (or "management issues," as he writes) are unique; most fit into one of a dozen kinds of archetypes researchers have identified. Recognizing a pattern will not solve the problem, but will enable a systems-based approach so that the person or group can step back and see the building blocks of the situation: "reinforcing processes, balancing processes, and delays."²⁰ As Senge puts it, the "purpose of the systems archetypes is to recondition our perceptions, so as to be more able to see structures at play, and to see the leverage in those structures."²¹

Two archetypes that commonly apply to complex problems are "Limits to Growth," and "Shifting the Burden." In the first case, he expresses that instead of pushing growth, organizations (or individuals) should remove the factors limiting growth. If the limitation is ignored and growth is pushed, there might be small advancements initially, but ultimately there will be failure.²² For example, overworking certain individuals rather than finding a way to share or limit the workload will push growth in a way that is unsustainable. Removing the limitations, such as searching out and removing extraneous tasks, or increasing employees, meet the intent of this archetype.

Shifting the Burden is another archetype that is often found within complex problems. The basic idea here is an underlying problem is too difficult or obscure to tackle, so people address the symptoms instead. Predictably, things might seem better for a while, but the root problem still exists and will grow worse, eventually causing even more trouble.²³ Senge's advice: "Beware the

¹⁹ Senge, 93.

²⁰ Ibid., 94.

²¹ Ibid.

²² Ibid., 94-101.

²³ Ibid., 103.

symptomatic solution;” the benefits will be short-term at best, and in the meantime the capabilities for a better solution could atrophy, leaving the situation worse off in multiple ways.²⁴ Both of these archetypes apply and are explored further in the case study.

Groupthink

Beyond the organization as a whole, characteristics of the problem solvers themselves also influence the manner in how they approach the issue at hand. Irving Janis identified the term groupthink, which refers to “a deterioration of mental efficiency, reality testing, and moral judgment that results from in-group pressures,” especially in dealing with problem-solving.²⁵ In his book, *Groupthink*, Janis covers multiple fiascos that show how major defects in decision making arise from problem-solving as a group. Unnecessarily limiting courses of action, personal bias, failure to fully evaluate options, and failure to consider contingencies or problems that could arise during implementation are just a few. While Janis argues that more amiable and cohesive groups are more likely to fall victim to groupthink and lack independent critical thinking, his intent is to inform the reader on the concept in order to avoid the pitfalls and dangers in group problem-solving.²⁶

His ideas to mitigate potential groupthink place responsibility with the leader. The chief of the group should encourage all members to voice objections and doubts, at the beginning and throughout the process. Additionally, the leader should begin the problem-solving process impartially rather than stating his or her preferred solution, preventing as much bias as possible from influencing the development of ideas. Finally, if the situation and time permits, the

²⁴ Ibid., 103.

²⁵ Irving L. Janis, *Groupthink*, 2nd ed. (Boston: Houghton Mifflin Company, 1982), 7-9.

²⁶ Ibid., 1-13.

organization should have multiple groups, under different leaders, working on the same issue.²⁷ None of these alone will guarantee prevention of groupthink. But as with most of the previously covered topics, awareness is a critical first step to establishing the best environment for problem-solving.

Wicked Problems

Finally, after considering all of these theories on organizations, learning and group problem solving, specific issues with wicked problems need to be clarified. Rittel and Webber's first main point is that there must be thorough goal formulation when approaching a wicked problem.²⁸ The objectives must be as critically considered as the models and inputs to solving those problems, which lines up with the idea that a large organization must fully understand the issue and assets. Along with that, however, is their belief that "one of the most intractable problems is that of defining problems...and locating problems (finding where in the causal networks the trouble really lies)."²⁹ Even when an organization recognizes that a problem exists, building a true understanding of that problem is a wicked problem in and of itself.

Rittel and Webber go on to explain that to describe a wicked problem in sufficient detail, one would also need an exhaustive list of possible solutions in order to anticipate future questions.³⁰ In other words, it is impossible to completely understand the problem because coming up with and understanding all conceivable solutions is impossible as well; fully understanding a wicked problem *is* a wicked problem. Therefore, the hypothesis remains that when approaching a complex

²⁷ Janis, 262-64.

²⁸ Rittel and Webber, 156.

²⁹ Ibid., 159.

³⁰ Ibid., 161.

problem, organizations must limit their research and eventually move on with the process as best they can.

The second part of the hypothesis, understanding how possible solutions could affect the problem and organization, can also gain clarity from Rittel and Webber's work. As mentioned previously, there is no completely valid test of a solution, as every attempt leaves traces and the consequences will continue to occur over time.³¹ Considering the challenges in understanding the current situation and assets, the idea of being able to predict possible outcomes in the future is even more overwhelming. However, going back to Senge's principles in *The Fifth Discipline*, a learning organization can mitigate the challenges found in wicked problems by looking for archetype patterns, testing conclusions with small actions, and giving the tests time to come to fruition.³² Depending on the issue, it could take a very long period of time, but it is necessary to judge the results and adapt the solutions as required.

Hypothesis Clarification

From organizational structure and effects of complex adaptive systems, to learning organizations and the roles and impacts of leaders and group members, there are many parts of an organization that when combined create more than they are alone. But to go back to the research question, which concepts are most critical for large organizations to focus on when approaching complex problems?

Ultimately, the original hypothesis needs further explanation. When it comes to wicked and complex problems, there is no ability to fully understand anything, be it the problem, assets, or impact of solutions. Therefore, a large organization must add in the balance of knowing when to consider enough is enough, and move on to implementation. There are no "true-or-false" solutions,

³¹ Rittel and Webber, 163.

³² Senge, 112.

as Rittel and Webber said, only good or bad ones.³³ As a solution is implemented, the organization, through a designated leader, must monitor as best they can the impacts on the problem and solution, and be prepared to adjust course as necessary (and possible) to keep things in the “good” category. This is why large organizations must strive to best understand the issue and available assets within given or perceived time constraints. They should consider, and when possible, test, how solutions will affect the specific problem and the future of the organization itself through research, reflection, and long-term observation. Large organizations must recognize the limitations and challenges of their complex systems, and determine the proper balance of research and implementation for each particular situation. Using this understanding of organizational theory, the next section explores how the Air Force understands its mission and deals with wicked problems impeding it, specifically retaining fighter pilots.

USAF Background: Words vs. Actions in Pilot Retention

If I were given an hour to save the planet, I would spend 59 minutes defining the problem and one minute resolving it.

—Albert Einstein

Since its inception in 1947 as a separate entity from the Army, the United States Air Force has faced its share of complex problems. In a constantly changing world filled with innovation, competition for power and resources exist both in and outside of the organization. From the top down, the Air Force seeks to deliver on its mission to “Fly, Fight, and Win in Air, Space, and Cyberspace” in support of the President and national strategy.³⁴ From the ground up, airmen and commanders strive to do more with less, and creatively complete their task at hand with the resources available. And as the mission moves forward in space and time, the strategies of all the actors constantly influence each other and the wicked problems that exist in this complex adaptive

³³ Rittel and Webber, 162.

³⁴ US Air Force, “About Us,” accessed March 11, 2017, <http://www.af.mil/AboutUs.aspx>.

system. This section will expound on some of the major strategies and aims of the Air Force, as well as provide a background and history of the pilot retention conundrum.

View From the Top

In the *United States Air Force Posture Statement 2016*, the Secretary of the Air Force (SECAF), Deborah Lee James, and CSAF Gen. Mark A. Welsh, III, presented major strengths and challenges, both internal and external, of the Air Force to the US Senate. Their appeals for an appropriate budget explained that inadequate funding would not allow the Air Force to successfully fulfill its roles of “Global Vigilance, Global Reach, and Global Power for America.”³⁵ As a critical component of the joint force, airmen continued to defend the United States but must be “properly trained, effectively equipped, and instilled with the trust of their leadership.”³⁶ The message expressed that the Air Force was an educated, innovative, and motivated organization, but faced difficult challenges by the “do more with less” mentality in a contested and unpredictable geopolitical landscape.³⁷

Beyond the focus on the next budget, the Air Force wanted to look farther into the future, as it did with the publishing of the *USAF Strategic Master Plan* (SMP) in May 2015. Organizing and building on strategies from other Air Force documents and goals, the SMP provided a strategic framework and vector for the next thirty years.³⁸ The imperatives of *agility* and *inclusiveness*

³⁵ Department of the Air Force (DAF), *United States Air Force Posture Statement 2016*, Statement of the Honorable Deborah Lee James and Gen. Mark A. Welsh, III, Presentation to the Committee on Appropriations Subcommittee on Defense, United States House of Representatives, February 10, 2016, (Washington, DC: DAF, 2016), http://www.af.mil/Portals/1/documents/airpower/FY16_AF_Posture_Statement_FINALversion2-2.pdf, 2.

³⁶ *Ibid.*, 6.

³⁷ *Ibid.*, 1-6.

³⁸ United States Air Force, “Strategic Master Plan,” accessed March 11, 2017, http://www.af.mil/Portals/1/documents/Force%20Management/Strategic_Master_Plan.pdf.

focused on the people, culture, and organization, by providing strategic direction, goals, and objectives with topics such as development, education, training, partnerships, and structure of organizations and teams.³⁹ The SMP additionally expanded on five strategic vectors with operational and technical goals and objectives to support the Air Force core missions.⁴⁰ Finally, it included four annexes that provided sub-objectives in human capital, strategic posture, capabilities, and science, and technology, to aid those who implement the strategies by prescribing actions.⁴¹ Overall the intent of the SMP was to provide planning direction, align activities across the force, and track progress.⁴² The tone it set, however, was similar to General Welsh's address in that there were significant challenges ahead, but by the right balance of resources and prioritization, the Air Force was generally up to the task.

These documents show that the Air Force was purposefully and strategically planning for the future, and recognized that its airmen were an essential part of that future. But in an organization as large as the Air Force, delegation and clear communication up and down the chain of command are vital for success. The SECAF and CSAF laid out their plans and expectations to clarify priorities, but there was still much to be done at all levels to effectively see these through, especially when complex problems arise, as they were sure to do. Some of these problems were relatively small, and while complex, were appropriately handled at their local level. Others, as with the pilot retention problem, grew to the point they affected a greater portion of the organization and its ability to do its mission, and could no longer be ignored or minimized. However, recognition was not enough; there must be follow-through. But an inherent obstruction to problem solving in a

³⁹ Ibid., 5-35.

⁴⁰ Ibid., 36-62.

⁴¹ Ibid., 6.

⁴² Ibid., 7-8.

large organization is, in fact, its size, and ability to communicate vision and solutions up and down the chain.

Communicating the Vision

Moving then from the strategic towards the operational and tactical levels of the Air Force, how did leaders implement the main strategy and deal with complex problems? Shortly after Gen. David L. Goldfein took over as the CSAF in July 2016, he released a letter to all airmen expressing one of his main priorities: revitalizing the squadron. Connecting the Air Force strategies to the organizations and individuals that perform the missions, he emphasized the importance of the squadron as the foundation to successfully achieving the Air Force's missions. He described the squadron as "the beating heart of the United States Air Force; our most essential team."⁴³ He felt morale was a critical component to the mission, and that it was most affected within the squadron, for good or bad. Recognizing there were many obstacles to achieving the goals and objectives laid out in Air Force strategy, Gen Goldfein stated that the processes and solutions reside within the squadrons. Therefore, he announced, revitalizing those squadrons would be the main focus his first year as CSAF.⁴⁴

It is evident, though, that just as wicked problems evolve, the state of the Air Force continued to do the same. In the following few months, airmen and outside commentators alike voiced numerous initiatives, ideas, and concerns dealing with morale, manning, education, and more. "Culture" and "climate" were the current buzzwords; issues on how people "feel" and morale became a top priority, as the Air Force struggled to keep talent in the ranks. Taking a clear vision and executing it down the chain challenges any organization, but General Goldfein looked to

⁴³ Goldfein, David L., "CSAF Focus Area: The Beating Heart of the Air Force...Squadrons!" Letter to Airmen, August 2016, http://www.af.mil/Portals/1/documents/csaf/letters/CSAF_Focus_Area_Squadrons.pdf, 1.

⁴⁴ Ibid., 1-3.

improve the process through initiatives like decreasing additional duties, giving Airmen more options in their career paths, and improving incentives for pilot retention.⁴⁵ In line with Senge's archetype, the Air Force was looking for ways to remove limitations to growth, rather than push it.

Talent retention is another important part of any organization, especially when that talent is not easily replaced and takes a significant amount of time, money, and resources to develop. The Air Force has struggled with retaining experienced pilots in the ranks for decades, and while the specific reasons may have shifted, there were many consistencies in why pilots were leaving. So why was this problem still plaguing the Air Force? Ultimately, it was a perfect example of a wicked problem, and even though some issues seemed obvious, significant challenges remained to find a successful solution, or even a temporary resolution to slow the exodus. The next section introduces the development of this problem.

A Short History of Pilot Retention

As far back as 1979, discontented pilots began to leave the ranks in droves. F-4 pilot Capt. Ronald Keys penned his "Dear Boss" letter to the commander of Tactical Air Command, as a consolidation of frustrations that fighter pilots were dealing with after the Vietnam War.⁴⁶ Lack of support from leadership and base offices, unbalanced emphasis on professional military education and professional appearance over training and flying abilities, and general low esprit de corps were just some of his comments on how the Air Force had lost sight of the big picture.⁴⁷ He was willing to risk reprisal and speak up for himself and other pilots who knew the system needed to change, or

⁴⁵ Deborah L. James and Gen David L. Goldfein, "Reducing Additional Duties," Memorandum for All Airmen, August 2016, accessed March 17, 2017, www.af.mil/Portals/1/documents/SECAF/160816_Airmen%27s_Time_Memo.pdf?ver=2016-08-19-123457-897.

⁴⁶ This letter is reproduced as an appendix to, Lt. Col. Brian T. Stahl, "Blunting the Spear: Why Good People Get Out," School of Advanced Air and Space Studies, Drew Paper No. 24 (Maxwell Air Force Base, AL: Air University Press, Air Force Research Institute, 2015).

⁴⁷ Ibid., 1-2.

it would lose more and more pilots to the airlines and other jobs on the outside. These officers were passionate about their Air Force and fellow airmen, but it was not enough to counteract the negative culture that was becoming the new norm.

The next year, in a different approach, Air Force Maj. James Little published his thesis, “US Air Force Rated Retention Problem: An Analysis Through the Tactical Air Command Aircrew Concerns Report,” at the US Army’s Command and General Staff College. He methodically studied and analyzed the extremely high proportion of rated officer voluntary separations from 1976 to 1979 and its impact on the combat capabilities of the US Air Force.⁴⁸ He found that the retention problem started slowly in 1970, by 1977 was causing massive losses, and by 1979 only 30 percent of pilots were staying beyond their commitment, which was less than half of the requirement to sustain the force.⁴⁹ It was continuing to get worse, and Little described it as “a complex problem, not fully understood and most assuredly not controlled.”⁵⁰

A conference held by the Air Force in October 1978 enabled a mix of rated officers, mostly captains, to voice their concerns, but there was little guidance or clear objectives to focus the discussion.⁵¹ Issues with the process made it less than scientific, but the concerns that made their way to the discussion included additional duties, ground training requirements, personnel/assignment issues, lack of confidence in leadership, micromanagement, and overall quality of life, including hours worked and pay and benefits.⁵² Frustrations with the “up-or-out” promotion system, perceptions of a “one mistake Air Force,” and perceived discrepancies between

⁴⁸ Maj. James E. Little, “U.S. Air Force Rated Retention Problem: An Analysis Through the Tactical Air Command Aircrew Concerns Report,” (master’s thesis, US Army Command and General Staff College, 1980).

⁴⁹ Ibid., 28.

⁵⁰ Ibid., 29.

⁵¹ Ibid., 30-33.

⁵² Ibid., 41-43.

the amount of work and sacrifice compared to the benefits received were issues then and still are now, as will be shown later in this section.⁵³ For all the complaints, requests, and recommendations made, it still did not answer the question of which shortfall (or combination) was causing pilots to leave by the droves, though Major Little believed an increase in pay would be the most effective way to stop pilots from leaving.⁵⁴

Based on the hypothesis, however, the most effective solution must address the root cause. For example, when training students, instructor pilots attempt to find the root cause of a problem, which needs to be distinguished from other symptoms in order to solve the underlying problem. If an aircraft slows below the standard on final approach, that needs to be corrected, but *how* it is corrected needs to be based on *why* it is happening. Is the power setting too low? Is the student's visual reference off? Is the student so airsick he cannot properly control the aircraft? Blindly adding power to increase the speed may fix the immediate problem, but may only be a short-term solution if they do not identify the *reason*. Just as Senge alluded to in his "Shifting the Burden" archetype, reacting to the symptoms may help initially, but could lead to larger problems in the future.⁵⁵ According to Major Little's study, pilots believed they should be paid more to compensate for all the negative aspects of the job, but was pay truly the problem, or was it other issues frustrating them? What was the *root* problem?

Fast forward a couple of decades, and a RAND study published in 2000, *The Air Force Pilot Shortage: A Crisis for Operational Units*, sought to find that answer. By the time the authors did their research, the Air Force was facing "the largest peacetime pilot shortage in its history."⁵⁶

⁵³ Little, 50-52.

⁵⁴ Ibid., 79.

⁵⁵ Senge, 103.

⁵⁶ Bill Taylor, Craig Moore, and Charles Robert Roll, *The Air Force Pilot Shortage: A Crisis for Operational Units?* (Santa Monica, CA: RAND, 2000), iii.

They found high numbers of experienced pilots were leaving at the end of their active duty service commitment for two main reasons: excellent opportunities in the private sector, such as the airline industry, and high ops tempos that degraded their quality of life.⁵⁷ Younger pilots still owing time on their commitments remained, but they required more training hours and experienced pilots to fly with them. As experience dwindled, more hours were required to get and maintain flying currencies, which did not always happen.⁵⁸ The stress of doing more with less continued, even in peacetime.

At the conclusion of their research, Taylor, Moore, and Roll believed that the real problem was the experience level in operational units. The only way to keep it manageable involved keeping squadrons manned with no less than fifty-five percent experienced fighter pilots, and reducing the number of new pilots, so not as many experienced ones would be required to instruct them. There were other suggestions as well, but it is important to note they realized this would only manage the experienced pilots that were still in, and not necessarily keep them from leaving. The researchers recognized this was a complex problem, and for all their analysis and recommendations, they knew they were only addressing a portion of it.

In line with the hypothesis of this paper, the researchers collected as much information and analysis as they, the experts, felt necessary to describe and understand the problem and its root causes. When looking for possible solutions, they considered how they would affect the problem and the organization, recognizing “they must be implemented carefully and evaluated thoroughly to deal with cultural issues and prevent unintended consequences.”⁵⁹ These were the key issues they found when approaching their complex problem, and support the recommendation of this paper.

⁵⁷ Taylor, Moore, and Roll, xi.

⁵⁸ Ibid.

⁵⁹ Ibid., 39.

As time went on, the Air Force did enough to keep pilots employed, and fulfilled its mission. But based on the fact that pilot retention continued to plague the Air Force, an adequate solution to this wicked problem had yet to be found. Moving forward to when General Welsh commanded United States Air Forces in Europe (USAFE) in 2011, he already saw the impending crisis. In an email he sent to USAFE fighter pilots, he explained that his “concern is not that you’ve made the choice to pursue a new path, but that we don’t really understand why you made the choice.”⁶⁰ At that time, personnel predictions forecasted a shortage of 300 pilots in Fiscal Year 2013, increasing to over 1000 within eight years.⁶¹ General Welsh and other leaders saw that they needed to understand the reasons behind the exodus before they could effectively slow or stop it.

As the complex problem continued to grow, others beyond the Air Force as an organization was looking for solutions. There were plenty of ideas from current and former airmen, filling blogs and social media with opinions and ideas. Lt. Col. Brian Stahl, a student at the Air Force’s School of Advanced Air and Space Studies, authored an award-winning master’s thesis that was later published by the school. In “Blunting the Spear: Why Good People Get Out,” he collected and analyzed retention reports, conducted surveys and interviews to discover if there truly was a retention issue, and if so, what were the causes and best solutions.⁶² Again, in relation to this monograph’s hypothesis, he gathered as much information as he deemed necessary and appropriate, by focusing on Air Combat Command communities of bomber, fighter, and remotely piloted aircraft pilots. Remarkably, across the board, most of their complaints and reasons for separating could have been pulled from Major Little’s or Captain Keys’ writings; they had not changed. A great deal of time and focus went into organizing and analyzing the information until

⁶⁰ Quoted in, Stahl, 184.

⁶¹ Ibid.

⁶² Stahl.

Lieutenant Colonel Stahl found what he believed were the best solutions, which were adjusted to meet each aviation group's particular problems and needs.⁶³

Just as with the RAND study, the second part of the hypothesis does not apply as these were independent research projects. But in both cases, a thorough analysis helped define the problem and root causes, which provided the ground work to implement future solutions. The next section, a case study on what the Air Force officially did about this problem in 2015-2016, analyzes their approach against the full hypothesis, as they had not only the tools to research the complex problem but the resources to do something about it.

This section explained briefly the strategic vision and priorities of the Air Force, as well as some of the challenges it faced as a large organization. Details on pilot retention, spanning four decades, show that this complex problem is not an easy one to solve, but the amount of effort and priority given to it in the past remains unclear. In 2015, pilot retention, especially of fighter pilots, was a front-and-center issue being acknowledged not only in the ranks but internationally by the media. The next section is a case study of how the Air Force dealt with the complex problem of fighter pilot retention in 2015-2016, and what key considerations it used to do so.

Pilot Retention: A Problem within a Problem

You are nibbling around the edges; I am looking for bigger and bolder solutions.

—Gen Mark A. Welsh, III, CSAF, to the Air Staff, December 2015

The same retention problem General Welsh inquired about in 2011 was approaching a crisis level in 2015. The Air Force struggled to fill cockpits, due in part to organizational and personnel management, but ultimately because pilots were leaving in higher numbers. If the trend continued, serious concern existed as to if the fighter community would be able to fulfill its mission in the future. Management of fighter pilot manning was a wicked problem. One of the root causes,

⁶³ Ibid., 105-17.

pilot retention, was yet another wicked problem inside of that. As Rittel and Webber pointed out in their distinguishing properties of wicked problems, each one “can be considered to be a symptom of another problem.”⁶⁴ The Air Force needed to solve both.

Now serving as CSAF in 2015, General Welsh delegated the approach of this complex problem to his Air Staff. The following case study covers the research the team did in fighter pilot retention from September 2015 through August 2016, including their methods, challenges, and recommendations. Their approach is evaluated against the considerations in the theory section and the hypothesis, to see how those recommendations perform in a real-world, complex problem. The analysis done here is not to judge whether or not they found the right or best solutions, but to study how a large organization approached a complex problem.

Understanding the Problems

In a telephone conversation with the author on August 31, 2016, Air Staff project lead Col. Jason Cockrum explained the details of their process over the previous year, including how they saw the complex problem and the approach they took to resolve it. In September 2015, General Welsh directed the staff to “start with a blank slate and redesign the fighter community.”⁶⁵ They understood their task as developing a “strategy and implementation plan that will ensure the Air Force has an enduring proficient and sufficient fighter pilot force.”⁶⁶ The impending crisis might be one of retention, but they viewed their goal as bigger than just keeping people in for the short term; they desired a new plan that would fix the manning problem for the long term.⁶⁷ Instead

⁶⁴ Rittel and Webber, 165.

⁶⁵ Col. Jason Cockrum, “Fighter Enterprise Design,” US Air Staff briefing, March 17, 2016.

⁶⁶ Ibid.

⁶⁷ Col. Jason Cockrum, “Fighter Enterprise Design: Retention,” US Air Staff briefing, December 22, 2015.

of trying only to solve retention, which had been unsuccessfully attempted so many times in the past, this new approach had higher ambitions.

As with any complex system, a significant number of moving parts and people existed within the organization and influenced the current conditions. Additionally, they faced a moving target as the situation continued to develop during their research. This was a textbook example of a wicked problem in that an infinite number of solutions were possible, and they could not explore them all in depth. Finding that point of knowing when they had enough information to make a recommendation was critical. Too much time spent could greatly affect the short-term goal of immediate retention, but adequate time was required to fully investigate and make the best of the future of the Air Force.

The first step was to analyze the situation and all it entailed methodically. A team of seven Active Duty, Guard, and Reserve officers gathered to brainstorm and “whiteboard” the problem. The group’s initial sessions indicated that, while fighter pilot retention (after reaching their initial commitment) had hovered around 65 percent from 2001 to 2013, the following two years after that saw significant drops, and by 2015 was down to about 36 percent.⁶⁸ At this rate, the shortage truly was approaching a crisis level, significantly impacting the Air Force’s ability to perform its mission. How and why did the numbers drop so low? What was causing the mass exodus, and how could they stop it?

To gain insight across the board and narrow the field to manageable options, they began their investigation by querying the current fighter pilot force. Surveys from seventeen active duty fighter operations group commanders provided numerous problem areas, as well as recommended ideas for solutions. The responses were consistent across platforms, with proposals on how to

⁶⁸ Cockrum, interview by the author.

improve the quality of life for fighter pilots and their families.⁶⁹ The staff did not immediately quantify the results as to which reason or reasons were the most significant, or if one particular was a root cause that, if corrected, would stop the exodus, but focused on fielding any and all concerns to build situational awareness of the big picture through specific details. However, as they compiled the data from units around the globe, the same issues and themes appeared consistently, giving the staff an idea of the likely root causes.⁷⁰

To revisit the first part of the hypothesis: it is key for large organizations to understand the issue, its root cause, and available assets within the given time restraints. With this problem, the Air Force faced not only deadlines set by the CSAF; it also had an annual cutoff date for experienced fighter pilots to sign the bonus and stay on active duty. Air Force leaders needed to take action as soon as possible. Moving forward from the initial data collection, the staff coordinated a Continuous Program Improvement Process, event to build on that data. Whereas the first compilation came through the official chain of command, which filtered and organized the data before sending it to the Air Staff, this inquiry involved a broad, diverse group who provided inputs directly. A wide range of personnel, including both combat and mobility forces, Naval officers, Air Force Personnel Command representatives, as well as Active Duty, Guard, and Reserve officers convened in October 2015. Building off of the previous information, they determined the root causes for why people were leaving: assignments, quality of life, culture, career development, ops tempo, leadership, and airline hiring. Then, based on the resources they believed the Air Force had or could obtain, they developed thirty solutions to increase retention, most dealing with policy reform.⁷¹

⁶⁹ Col. Jason Cockrum, "Fighter Squadron Quality of Life Recommendations," US Air Staff briefing, November 5, 2015.

⁷⁰ Cockrum, interview by the author.

⁷¹ Ibid.

Further inquiries by an Air Force Smart Operations for the 21st Century Team on production and absorption and contributions by squadrons' and operations groups' leadership on how to manage Undergraduate Pilot Training and other training events continued to add to the analysis.⁷² By broadening their study with diverse opinions and ideas, they avoided an inherent bias of fighter pilots researching fighter pilots and minimized the hazards of groupthink. Multiple teams researched the same problem. Also, through numerous brainstorming sessions, creative thinking led to those thirty solutions, some of which fell beyond the realm of possibility, but encouraged open-mindedness for further discourse. When dealing with a topic that involved many preconceived notions by individuals both fielding and answering the questions, the researchers took care to keep all avenues of approach open and minimize assumptions.

Understanding the Solutions

Moving on to examine how the second part of the hypothesis fits, how did the Air Force consider the impact of solutions? Did it consider and test (if possible) how solutions would affect the specific problem and future of the organization? The short answer is yes. This next section explores how the Air Force did so and to what depth. Fully testing all thirty solutions would have been next to impossible, and at the very least, impractical. Instead, the staff estimated, on a scale of one to ten, the impact each solution would have on the retention problem, as well as a score of how difficult it would be to implement.⁷³ By doing this, it was able to quantify and qualify information where multiple solutions were possible. Not only did this make large amounts of data easier to digest and compare. It also aided in ascertaining where resources of time, money, and personnel would be needed.

⁷² Cockrum, "Fighter Enterprise Redesign: Retention."

⁷³ Ibid.

To refer now back to Senge's "Shifting the Burden" archetype, however, did these solutions address the root problems, or only the symptoms? One challenge here is that the team identified seven separate root causes, rather than only one or two. They assigned a weight value to them based on priority but trying to address so many items created its own set of problems. The staff desired to make "the biggest impact with the least amount of difficulty to retain fighter pilots," but while fixing the symptoms might benefit the short-term retention, it could also diminish future options for long-term success.⁷⁴ Ultimately, they needed solutions that would address both the short-term problem of immediate retention (symptoms) and long-term management of sufficient fighter pilot numbers (root cause). If they only focused on the long term and not the immediate, annual exodus of pilots, the situation would continue to get exponentially worse. And if they only persuaded pilots to stay in right now but did not make adequate changes to manage retention in the future, any success would be short lived. In this case, it was not an "either-or" situation of fixing the symptoms versus the root cause; it was imperative that they find a solution set that addressed both.

Another challenge they faced in selecting and promoting solutions for the CSAF's approval was the current system itself. General Welsh gave them an initial vector, but how far they could push the envelope in creative problem solving remained somewhat of an unknown. Based on the nature of bureaucracies, change is very difficult to implement, and the bigger the adjustment, the more resistance the organization faces. Perhaps due in part to this, of the thirty solutions, the average difficulty on a scale of one to ten was just 3.4. The average impact, however, was 7.5.⁷⁵ True to their intent, they focused their efforts on solutions that would have the most impact with least difficulty. But a vector check in December at the "Fighter Enterprise Redesign Retention" brief provided further guidance from Welsh: "...you are nibbling around the edges; I am looking

⁷⁴ Cockrum, interview by the author.

⁷⁵ Ibid.

for bigger and bolder solutions.”⁷⁶ In their effort to address both symptoms and the root cause, they were now given the leeway to explore more radical options. In regards to the first part of the hypothesis and fully understanding available assets, this development demonstrates the complexities in identifying resources available. All thirty of their original solutions challenged the status quo in some way; many were revolutionary. But the CSAF wanted them to push the envelope even further, and remove any self-imposed limitations.

The team got back to work, and over the next few months adjusted and improved upon their solution sets with an enhanced understanding of the issue, root causes, and assets available. They established three main focus areas that aligned with the root causes: eliminating extraneous requirements, maximizing production efficiencies, and improving retention. Twelve solutions and an implementation timeline addressed all three, and in line with the hypothesis of this paper, they considered the effects the solution would have on the immediate problem and future of the organization.⁷⁷

The retention problem that had so long plagued the Air Force now firmly sat as one of three wicked problems within the overarching one of redesigning the fighter pilot community. This full-spectrum approach finally did more than just address the symptoms, and by their estimates, the Air Staff believed the “get well” time would occur around 2026. Now they needed to get things moving.

Observing the Solutions in Action

The last part of the hypothesis, dealing with reflection and long-term observation of solutions, cannot yet be fully analyzed, but the Air Staff shows promise of following through in the future. The retention issue has only gained more attention, with remotely piloted aircraft and

⁷⁶ Ibid.

⁷⁷ Ibid.

mobility forces unfortunately also showing signs of an impending crisis in their ranks. The work accomplished by the Air Staff up to this point centered on fighter pilots, but many of the solutions did or could adapt to apply to other rated communities.

The first solutions executed by the Air Force did, in fact, positively affect the entire organization. In late summer of 2016, the SECAF and CSAF released guidance reducing additional duties and online training, and General Goldfein announced the initiative on squadrons, as mentioned in the previous section. In accordance with Senge's "Limits to Growth" archetype, the Air Force removed limitations through these proposals. Where many of the frustrations felt by airmen came from pushing obligations that had nothing to do with their primary duties and little to no apparent utility, senior leaders now removed these limits. Even with Goldfein replacing Welsh as the CSAF, the momentum behind solving these complex problems continued to propel them forward.

As of September 2016, about one-third of the solution sets were implemented, one-third were in the process of execution, and the last few still needed time and work but were on track. None the less, just as there was no one root cause, they did not believe there was one solution that would solve this wicked problem. It would take a shift in thinking, action, and culture to successfully carry out the changes the Air Force decided on, and it would also take persistence and dedication over a long period of time. Even immediate actions like increasing the resigning bonus and the other previously mentioned solutions will take time to analyze for impact.

In regards to the final part of the hypothesis recommending further research, reflection, and long-term observation, the staff continued to update the CSAF at a minimum of every forty-five days and planned discussions at future aircrew summits and other conferences at different levels of the organization.⁷⁸ The higher echelons would continue to work the problem and solutions while the

⁷⁸ Ibid.

lower echelons, such as the squadrons, would need to maximize their efforts in the continual more-with-less environment as the Air Force put solutions into action. As Rittel and Webber attested, “there is no immediate and no ultimate test of a solution to a wicked problem,” and any attempted solution to a wicked problem counts significantly.⁷⁹ Just as the Air Force will not know for some time how effective their solutions are, there is no way to completely analyze how well they complied with the last part of the hypothesis, because it too deals with the future. But a review of their planning and research thus far shows that they see research, reflection and long-term observation as important steps in their problem solving and will incorporate them in the years to come.

Final Analysis

Over the past few decades, attempts at solving the retention problem focused on fixing the symptoms, without truly understanding and affecting the root causes, or realizing retention itself was a symptom of a bigger problem. The complexity of this layered, wicked problem made it difficult to discern root causes as they overlapped and influenced each other, but analysis over the years showed that previous solution attempts did not fix the problem. In 2015, the Air Force zoomed out on the situation, and, instead of only trying to keep pilots in through short-term solutions like bonuses, its goal was to “develop a strategy and implementation plan that will ensure the Air Force has an enduring and sufficient fighter force.”⁸⁰ While it will be years before the impact can be understood, based on their recent approach, the Air Force appropriately focused on key considerations that should enable them to find the best solutions for this complex problem.

This monograph focused on the history of retention, but it is important to remember the Air Staff unraveled more than that one problem. It was a significant piece of the puzzle, but they

⁷⁹ Rittel and Webber, 163.

⁸⁰ Cockrum, interview by the author.

believed solutions for fighter pilot manning involved three separate areas: requirements, production, and retention.⁸¹ However, improvements in any of these categories would, in theory, improve retention since it was both a symptom of other problems and a wicked problem itself.

Retention was an obvious cause of the pilot shortage, but the staff needed to research other contributing factors, such as the training pipeline, staff billets filled by fighter pilots, in-residence schools, to understand the root causes and find the most efficient solution sets. The complexities they found here were no surprise; most of the factors that contributed to the manning shortage also contributed to pilots choosing to leave. They needed to correct the appropriate root causes to improve both short- and long-term situations. Many answers seemed obvious to the staff as they had been living it and discussing it for years, but they did not let their personal opinions and biases answer the question for them. Instead, they began a deliberate and widespread investigation into *understanding the problem, its root causes, and the available assets within the time restraints* set by the CSAF. As time went on, they considered how *solutions would affect the specific problem and future of the organization through initial research*. When it comes to *long-term reflection and observation*, they set a plan in place that encouraged continuous follow-up and research.

This case study showed an example of a complex problem in a large organization. Through research and analyzation, the key considerations recommended by the hypothesis were indeed found in the method Air Force chose to approach the complex problem of fighter pilot retention. As with any wicked problem, there was no one perfect solution, but the steps the Air Force took addressed retention better than it had in the past and should make a significant difference in the future.

⁸¹ Ibid.

Conclusion

Americans have a tendency to believe that when there's a problem, there must be a solution.

—Henry Kissinger

This study on wicked problems shows that finding and implementing solutions can be extremely challenging, and often impossible. However, it should not discourage the reader from attempting to do so. By understanding the complexities behind wicked problems, and applying the hypothesis of this paper, organizations can improve their situation, even as the environment changes around them.

The first section of this monograph explained the structure and theory of organizations, including culture, power, learning organizations, and wicked problems. It showed patterns and similarities that exist in organizations and problems, including Senge's archetypes, Rittel and Webber's properties of wicked dilemmas, and how understanding these concepts aid an organization in approaching their problems. The next section provided background to the current fighter pilot retention problem by describing the history of the problem, as well as some of the major focus areas and strategies of the Air Force through 2016. It revealed that even though pilot retention had vexed the Air Force for decades and plenty of research and recommendations had been made, a proper solution had not been found or implemented.

The case study and analysis broke down the process the Air Force used in 2015-2016 to resolve fighter pilot manning and its embedded problem of retention. Once again, the intent here was not to judge their answers, but analyze and learn from their approach. The complexities surrounding this set of wicked problems make it difficult to solve, but the Air Force methodically and aggressively pursued the answers, giving more effort, time, and resources than it had in the past. According to Rittel and Webber, there are no "true-or-false" solutions; only "good-or-bad."⁸²

⁸² Rittel and Webber, 162.

Only time will tell how “good” the Air Force’s solutions are, but their approach aligned with this paper’s hypothesis in that it included the key tasks involving understanding, consideration, and observation. A shift from past attempts over the years where retention problems were acknowledged but inadequately addressed, they now saw it was not only a problem within itself but a root cause of something bigger. They were then able to adjust focus to redesigning the fighter community as a whole, which ideally should solve both the retention issue and its overarching problem of ensuring a “proficient and sufficient fighter pilot force.”⁸³

Recognizing the layers involved in this case study leads to questions for further research. The Air Force took a step back to see that the retention problem was part of a larger wicked problem, and decided the entire fighter community needed an overhaul. Is this overarching problem just a symptom of an even bigger one that requires yet another step back? Is the Air Force, or even Department of Defense as a whole, organized and focused appropriately to best fulfill its mission in defense of the United States? How far back does this wicked problem go?

This, in turn, opens the door on yet another wicked problem: how do large bureaucracies implement change? This monograph focused more on analysis and understanding before, during, and after implementation, and not on how organizations should enforce solutions. For some Airmen, any retention solution will be “too little, too late,” but the Air Force does not have the luxury of giving up on its people. There are many articles and books on successfully incorporating change in organizations, such as John P. Kotter’s eight-step plan in *Leading Change*.⁸⁴ But how does this merge with wicked problems in large bureaucracies?

In line with the main idea of wicked problems, these questions show there is no stopping point and no end to the challenges a large organization will face. Answers will lead to more questions, those questions to new ideas, and all the while the environment is changing. The point is

⁸³ Cockrum, interview by the author.

⁸⁴ John P. Kotter, *Leading Change* (Boston: Harvard Business School Press, 1996).

not to discourage, but to encourage education so that organizations can be ready for these problems when they develop. Large organizations must focus efforts on understanding a wicked problem, its root cause, and assets available within the given time restraints, and consider how solutions affect both the problem and organization through research, reflection, and long-term observation. In doing so, they will better prepare themselves to successfully solve, or at least manage, the wicked problems that will continue to challenge them in the future.

Appendix 1: Rittel and Webber's Distinguishing Properties of Wicked Problems⁸⁵

1. There is no definitive formulation of a wicked problem
2. Wicked problems have no stopping rule
3. Solutions to wicked problems are not true-or-false, but good-or-bad
4. There is no immediate and no ultimate test of a solution to a wicked problem
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan
7. Every wicked problem is essentially unique
8. Every wicked problem can be considered to be a symptom of another problem
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanations determines the nature of the problem's resolution
10. The planner has no right to be wrong

⁸⁵ Rittel and Webber, 161-66.

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Interview

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